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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/803,949	03/19/2004	Xinming Wang	2004_0441A	7167

513 7590 11/09/2007

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EXAMINER	
BAREFORD, KATHERINE A	

ART UNIT	PAPER NUMBER
1792	

MAIL DATE	DELIVERY MODE
11/09/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/803,949	WANG ET AL.	
	Examiner	Art Unit	
	Katherine A. Bareford	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 October 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,6-10,12-19 and 32-34* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Claims 2-5, 11 and 20-31 are canceled

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The amendment filed October 18, 2007 has been received and entered. With the amendment, claims 2-5, 11 and 20-31 are canceled, and claims 1, 6-10, 12-19 and 32-34 are pending for examination.

Claim Rejections - 35 USC § 112

2. The rejection of claims 1, 6-10, 12-19 and 32-34 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement is withdrawn due to the deletion of the requirement that the pretreatment liquid is an aqueous liquid "free of any oxidizing agent" in the amendment of October 18, 2007.

3. The rejection of claims 1, 6-10, 12-19 and 32-34 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention is withdrawn due to the deletion of the requirement that the pretreatment liquid is an aqueous liquid "free of any oxidizing agent" in the amendment of October 18, 2007.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1, 6-9, 12-13, 17, 19 and 32-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ferrier et al (US 5843517) in view of Chen et al (US 6699380) and Japan 11-317161 (hereinafter '161).

Ferrier teaches a substrate processing method. Column 3, lines 15-35. A substrate is provided having both a metal region and an insulating film on a surface thereof. Column 2, lines 55-65 and column 4, lines 40-55. Ferrier provides a preplating treatment to the surface of the substrate, where pretreatment liquid (activator solution) is brought into contact with the surface of the substrate. Column 3, lines 15-25. This

liquid etches the surface from the acid in the liquid (thereby removing a metal oxide film form the surface of the metal region and residue from a surface of the insulating film, which will inherently occur given the "etching" and the amount of acid in the solution). Column 3, line 65 through column 4, line 10 and column 4, lines 30-40. At the same time, the liquid also contains catalyst ions that impart a catalyst to the metal region so as to activate the surface of the metal region. Column 3, lines 35-50 and column 4, lines 30-40. Then, pretreatment liquid remaining on the surface is removed in a rinsing treatment. Column 4, lines 20-25. Then an electroless plating process is performed on the surface of the substrate to selectively plate and alloy film on the surface of the metal region. Column 4, lines 20-30, column 3, lines 1-10, and column 5, lines 25-50. While Ferrier teaches adding an "oxidizing agent" to his pretreatment solution of aqueous acidic solution (column 3,lines 15-25), Ferrier also teaches "comparative" examples where the pretreatment liquid does not contain the "oxidizing agent" and rather can contain, for example aqueous acidic liquid containing palladium chloride (comparative example 1 or example 5 comparatives, for example) and notes the use of sulfates (column 2, lines 38-41) and further can contain acids in the form of hydrochloric acid (comparative example 1, 2) or sulfuric acid (comparative example 1, example 5 comparatives). Ferrier notes that electroless plating occurs from the comparative examples, and in some cases without overplate. See comparative examples 1 and 2 and example 5. The comparative examples teach useful and usable plating processes, because as discussed in MPEP 2123, "The use of patents as references is not

limited to what the patentees describe as their own inventions or to the problems with which they are concerned. They are part of the literature of the art, relevant for all they contain." In re Heck, 699 F.2d 1331, 1332-33, 216 USPQ 1038, 1039 (Fed. Cir. 1983) (quoting In re Lemelson, 397 F.2d 1006, 1009, 158 USPQ 275, 277 (CCPA 1968)). Furthermore, MPEP 2123 goes on to state that ""A known or obvious composition does not become patentable simply because it has been described as somewhat inferior to some other product for the same use." In re Gurley, 27 F.3d 551, 554, 31 USPQ2d 1130, 1132 (Fed. Cir. 1994)." These pretreatment materials are provided in a manner so as to form a continuous pretreatment film on the surface of the substrate during the pre-plating treatment, thus preventing the activated surface of the metal region from being re-oxidized since it is not exposed to an oxidizing environment. See comparative examples 1 and 2 and example 5 (the substrate is immersed in the pretreatment solutions for a set period of time).

Claim 6: the pretreatment solution can be applied by spraying. Column 4, lines 30-40.

Claim 9: the substrate can be immersed in the pretreatment solution. Column 4, lines 30-40.

Claim 12: the rinsing includes rinsing with water. Column 5, lines 20-25.

Claim 17: a desired temperature of the solution is between 20-40 degrees C. Column 4, lines 30-40. A desired concentration of components is also given. Column 3, line 35 through column 4, line 10.

Claims 32: the comparative pretreatment liquid can include sulfuric acid. See comparative example 1 and example 5 comparatives. Palladium is provided in the pretreatment liquids from salts such as palladium chloride. See comparative example 1 and example 5 comparatives. Ferrier also provides the use of sulfates and chlorides to provide the salts. Column 3, lines 38-41.

Claim 33: the preplating treatment simultaneously performs the metal oxide film removal (as shown by the etching), residue removal (as shown by the etching) and imparting the catalyst (activation). Column 4, lines 30-40.

Claim 34: the electroless plating is performed after removing the pretreatment liquid. Column 4, lines 20-30.

Ferrier does not teach that (1) the initial substrate is dry (claim 1), (2) that after electroless plating the substrate is post-cleaned and dried (claim 1), (3) spraying solution on a downwards facing substrate and rotating the substrate (claims 6,7), (4) the different flow paths (claim 8), (5) the pure water used (claim 12), (6) the cleaning using aqueous liquid mixed with one component or more of an electroless plating solution (claim 13), (7) maintaining conditions of the pretreatment conditions and electroless plating conditions (claims 17, 19), and (8) that the pretreatment liquid without oxidizing agent specifically removes metal oxides. As to a dry substrate, Ferrier does teach that the process can begin with contacting with the pretreatment activator solution, as the steps 1 and 2 are optional (column 4, lines 15-30).

Chen teaches a substrate processing method that can be used to treat integrated circuits with metal regions. Column 1, lines 15-20. The process includes providing a dry substrate to a processing module. Column 8,lines 5-20. Then, preprocessing occurs. Column 8, lines 10-20. Then, plating, which can be electroless plating, occurs. Column 8, lines 15-25 and column 1, lines 25-30. Finally, post processing, including rinsing, cleaning, and drying occurs. Column 8, lines 20-30. Rinsing in the various steps can be done with pure water. Column 5, line 1 and 39. Liquid can be dispensed to the substrate from a nozzle and the substrate can be facing downwardly. Column 5, lines 1-20. The substrate can be rotated during the treatment steps. Column 5, lines 1-20.

'161 teaches that it is well known that an acid solution of palladium chloride can be used to both etch and catalyze a surface prior to electroless plating. See the abstract. This surface to be etched is of metal oxide. See the abstract.

Referring to claim 13, the examiner has taken official notice that it is well known in the art of electroless plating to rinse the substrate with a surface active agent, reducing agent, chelating agent, complexing agent, or other component of the electroless plating bath prior to plating the substrate. As applicant has not traversed this statement from the June 9, 2006 Office Action, it is understood to be agreed to prior art.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Ferrier to (1) (2) provide that the initial substrate is dry and that after plating the substrate is post-cleaned and dried as suggested by Chen with

an expectation of providing a desirable electroless plating process, because Ferrier teaches a pretreatment and electroless plating process for a substrate and Chen teaches that when providing a pretreatment and electroless plating process, it is well known to start with a dry substrate and to post-clean and dry the substrate after plating. It would further have been obvious to (3) modify Ferrier to provide spraying solution and rinsing liquid on a downwards facing substrate and rotating the substrate as suggested by Chen with an expectation of providing a desirable electroless plating process, because Ferrier provides that the pretreatment liquid in the plating process can be applied by spraying and Chen teaches that it is well known in electroless plating to provide the liquids to a downwards facing substrate and rotating the substrate during treatments. (4) As to the different flow paths of claim 8, while the flow path system of the rinsing and the pretreatment fluid are not disclosed it would have been obvious to one of ordinary skill that the fluid leading into the nozzle from the pretreatment liquid source must flow from a different source than the rinsing fluid as the two fluids are different and must have different sources therefore the flow paths cannot be identical even if some of the same flow paths is used. (5) It would further have been obvious to modify Ferrier to provide pure water rinsing liquid as suggested by Chen with an expectation of providing a desirable electroless plating process, because Ferrier provides rinsing with water and Chen teaches that it is well known in electroless plating processes to provide pure rinsing water. (6) As to the cleaning using aqueous liquid mixed with one or more components of an electroless plating solution, it would

have been obvious to modify Ferrier in view of Chen to provide such a cleaning liquid with an expectation of providing a desirable electroless plating process, because it is well known in the art of electroless plating to be desirable to rinse the substrate with a surface active agent, reducing agent, chelating agent, complexing agent, or other component of the electroless plating bath prior to plating the substrate. (7) As to maintaining the conditions of the pretreatment conditions and the electroless plating conditions, Ferrier teaches desirable pretreatment liquid conditions, and it would have been obvious to one of ordinary skill in the art to maintain the conditions within the desired ranges in order to achieve the desired benefits of those ranges. As to the electroless plating conditions, it would be obvious to one of ordinary skill to keep the temperature, composition and component concentrations in predetermined ranges during the plating process so that the plating proceeds at a uniform rate. It would be obvious to one of ordinary skill to stop the plating process when the thickness of the plated layer reaches its desired thickness so that the plating does not progress pass the desired thickness. (8) It further would have been obvious that the pretreatment solution of Ferrier in view of Chen without the added oxidizing agent can desirably etch a metal oxide film on the metal surface as suggested by '161 as part of the process of providing a desirable electroless plating film, because Ferrier in view of Chen teach that a pretreatment liquid of palladium chloride or other salts can be provided in a aqueous acid solution with hydrochloric or sulfuric acid without further oxidizing agent added as a pretreatment liquid before electroless plating and Ferrier also teaches the desire to

activate and etch with pretreatment liquid, and '161 teaches that it is well known that palladium chloride in a acid solution can conventionally be used to etch and activate metal oxide surfaces, and thus the application of the palladium/acid solution without oxidizing agent of Ferrier can be desirably used for etching and activating.

7. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ferrier in view of Chen and '161 as applied to claims 1, 6-9, 12-13, 17, 19 and 32-34 above, and further in view of Stevens et al (US Patent No. 6824612).

Ferrier in view of Chen and '161 discloses all of the features of this claim except that the speed that the substrate is rotated at different times during the processing.

However, Stevens discloses that during the activation of a substrate for electroless plating it is desirable to rotate the substrate at relatively low speeds to facilitate even spreading of the activation solution, and after the application of the activating solution the substrate can be rotated at higher speeds in order to remove any excess activating solution (column 6 lines 30-45).

Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Ferrier in view of Chen and '161 to use the rotational speeds suggested by Stevens with an expectation that the benefits discussed above will be achieved.

8. Claims 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ferrier in view of Chen and '161 as applied to claims 1, 6-9, 12-13, 17, 19 and 32-34 above, and further in view of Yoshio et al (US Patent No. 6555158).

Ferrier in view of Chen and '161 discloses all of the features of these claims except that the pretreatment and plating are performed in an atmosphere having less oxygen than the atmosphere (claims 14, 15) and that a film thickness/property is measured after post-cleaning and drying.

However, Yoshio teaches an electroless plating process that includes pretreatment steps. Column 2, lines 30-45. Yoshio teaches that it is desirable to perform the pretreatment, rinsing and plating while rotating and discharging air pressure, thus lowering the pressure below atmospheric, reducing the amount of oxygen to levels below atmospheric. Figure 10 and column 7, lines 9-48. Yoshio also discloses performing a CMP (chemical mechanical polishing) procedure after the electroless plating, and that this can be done with ease. Column 8, lines 50-55. The only way to know the success of the CMP procedure is to measure the resulting film thickness after the CMP procedure.

Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Ferrier in view of Chen and '161 to discharge air pressure during the process steps as suggested by Yoshio in order to provide desirable treatment because Ferrier in view of Chen and '161 provides for treatment while rotating and Yoshio teaches that it is desirable to discharge air pressure while

rotating during treatment, thus lowering the pressure below atmospheric, reducing the amount of oxygen to levels below atmospheric. It would further have been obvious to modify Ferrier in view of Chen and '161 to measure film thickness after plating, post cleaning and drying as suggested by Yoshio in order to provide desirable treatment, because Ferrier in view of Chen and '161 provides plating, post cleaning and drying, and Yoshio suggests to further perform CMP procedures on the plated substrate, which would provide measuring the resulting film thickness after the procedure to confirm that the proper thickness and uniformity has been reached.

9. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ferrier in view of Chen and '161 as applied to claims 1, 6-9, 12-13, 17, 19 and 32-34 above, and further in view of Arcilesi et al (US Patent No. 4814205).

Ferrier in view of Chen and '161 teaches all of the features of the claim except measuring the concentration of an impurity and removing the impurity when it reaches a certain level.

Arcilesi teaches that when using an activator solution it deteriorates over time as the palladium ions precipitate out of the solution (form an impurity). Arcilesi teaches that when this happens the activator can be rejuvenated by addition of a ferric ion which redissolves the palladium (removes the impurity)(column 5 lines 15-30).

Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Ferrier in view of Chen and '161 to monitor the

concentration of the palladium ions and to add ferric ions to rejuvenate the solution when the amount of Pd ions got low so as to extend the useful life of the activator solution as suggested by Arcilesi.

10. The Examiner further notes that McConnell et al (US 6165912) teaches electroless pretreatment to activate and remove oxide and electroless plating. The Examiner further notes Ting et al (US 5169680) and Kaja et al (US 5380560) both teach activation pretreatment liquids to be used to prepare a substrate with a metal/insulating region for selective electroless plating.

Response to Arguments

11. Applicant's arguments filed October 18, 2007 have been fully considered but they are not persuasive.

Applicant argues as to the 35 USC 103 rejections to the claims that it is an important feature of the present invention to form a continuous pretreatment film on the surface of the substrate to prevent the activated surface of the metal region from being re-oxidized. Applicant argues that Ferrier teaches that the activator solution contains an oxidizing agent, and thus teaches to use an oxidizing agent specifically for oxidizing the surface of a metal substrate, and therefore clearly teaches away from providing a continuous pretreatment film on the surface of the substrate to prevent the activated surface of the metal region from being re-oxidized. Applicant further notes

that the Examiner referred to the comparative examples in which an oxidizing agent was not necessarily included in the "pretreatment liquid", but argues that none of the examples teach or even suggest application of an activator solution in a manner so as to prevent a surface of a metal region from being re-oxidized. Applicant argues that the other cited references also do not teach or disclose this feature.

The Examiner has reviewed these arguments, however, the rejection is maintained. The Examiner notes that Ferrier provides that the inventive activator solution of Ferrier uses oxidizing agent. However, as is fully discussed in the rejection above, the teachings provided by the Comparative Examples of Ferrier as to the use of a solution without added "oxidizing agent." (the Examiner notes that the reference to Japan 11-371161 is provided as to the obviousness that the comparative pretreatment solution will both etch and activate the surface of the substrate). As to Ferrier teaching away from the use of a solution without added "oxidizing agent", the Examiner notes MPEP 2123:

> "A known or obvious composition does not become patentable simply because it has been described as somewhat inferior to some other product for the same use." In re Gurley, 27 F.3d 551, 554, 31 USPQ2d 1130, 1132 (Fed. Cir. 1994) (The invention was directed to an epoxy impregnated fiber-reinforced printed circuit material. The applied prior art reference taught a printed circuit material similar to that of the claims but impregnated with polyester-imide resin instead of epoxy. The reference, however, disclosed that epoxy was known for this use, but that epoxy impregnated circuit boards have "relatively acceptable dimensional stability" and "some degree of flexibility," but are inferior to circuit boards impregnated with polyester-imide resins. The court upheld the rejection concluding that applicant's argument that the reference teaches away from using epoxy was insufficient to overcome the rejection since

> "Gurley asserted no discovery beyond what was known in the art." 27 F.3d at 554, 31 USPQ2d at 1132.).

In re Gurley as cited above would be to the point in this case, as Ferrier teaches that using the oxidizing agent provides better results, but that use of the pretreatment solution without the oxidizing agent still allows for electroless plating that can be desirable. The Examiner also notes that Ferrier provides that the activation pretreatment, including the comparative activation pretreatment, is provided by, for example, immersing the substrate in the pretreatment liquid for a set period of time. Therefore, the comparative pretreatment provides forming a continuous pretreatment film on the surface of the substrate, which will prevent the activated surface of the metal region for being re-oxidized during this pretreatment process, since the substrate is not exposed to oxygen. Ferrier does not teach that this is the purpose of this immersion, however, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). Here, the exact same "form a continuous pretreatment film on the surface of the substrate" (note that present claim 9 even provides for immersing the substrate in the pretreatment liquid) during pretreatment is provided, and therefore the same results are expected. Similarly, for example, "[T]he discovery of a previously unappreciated property of a prior art composition, or of a scientific explanation for the prior art's functioning, does not render the old

composition patentably new to the discoverer." Atlas Powder Co. v. Ireco Inc., 190 F.3d 1342, 1347, 51 USPQ2d 1943, 1947 (Fed. Cir. 1999).

Conclusion

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katherine A. Bareford whose telephone number is (571) 272-1413. The examiner can normally be reached on M-F(6:00-3:30) with the First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone numbers for the organization where this application or proceeding is assigned are (571) 273-8300 for regular communications and for After Final communications.

Other inquiries can be directed to the Tech Center 1700 telephone number at (571) 272-1700.

Furthermore, information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KATHERINE BAREFORD
PRIMARY EXAMINER